A numerical testbed (UNL-VRTM) for remote sensing of aerosols: new capabilities for non-spherical particles and illumination sources at night

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The UNL-VRTM, short for the Unified Linearized Vector Radiative Transfer Model, was specifically designed as a testbed for remote sensing of atmospheric aerosols, with additional potential for remote sensing of clouds, trace gases, and surface. It integrates analytically linearized vector radiative transfer (VLIDORT) with particulate and molecular scatterings, HITRAN spectroscopic gaseous absorption, and reflection models of land and water surfaces. Coupled with an optimal estimation facility, these components constitute a testbed tool that can simulate atmospheric remote sensing measurements from ultraviolet to thermal infrared (0.2 to 40 μm) and assess the capacity of any current or future observation system to provide quantitative information on atmospheric composition (aerosol, cloud, and gas) and surface properties. The UNL-VRTM package is freely available to the public through http://unl-vrtm.org.

Since its incept in 2014, the UNL-VRTM has gained dozens of user groups from eight different countries, and has been applied to a number of studies in Earth surface and atmospheric remote sensing. In this talk, I will present new capabilities of treating scattering of non-spherical particles, especially large dust particles, as well as nighttime radiative transfer calculations for illumination sources from moon, fires, and city lights. A brief overview of UNL-VRTM's benchmark for polarimetric remote sensing theory and application will also be presented.

Preferred mode of presentation: Oral